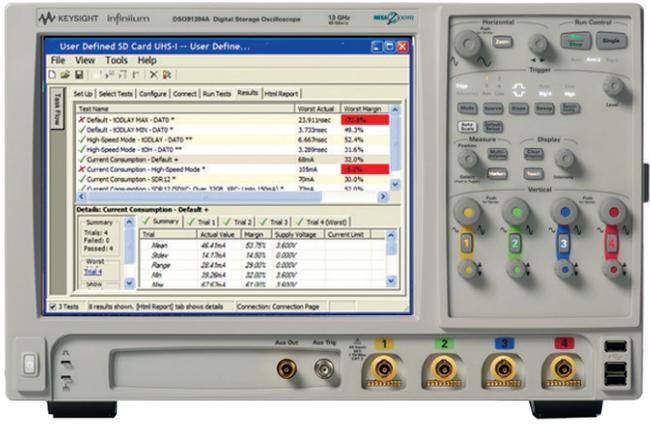
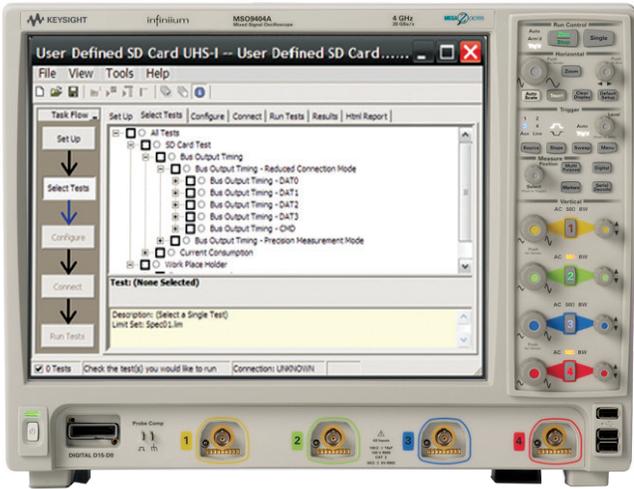


# Keysight U7246A and U7246B SD UHS-I Card Compliance Test Application For Infiniium Series Oscilloscope

Data Sheet



Unlocking Measurement Insights

## Features

The SD UHS-I card compliance test application offers several features to simplify the validation of your SD UHS-I card designs:

- Setup wizard for quick setup, configuration and test
- User-selected tests and configurations based on SD version 3.0 specifications and Test Spec for Card Ver3.00
- Integrated DUT control capability to provide read-write burst signal separation on the same bus in real-time mode, allowing a precise waveform capture as defined in SD UHS-I card compliance condition
- Test framework provides powerful characterization through multiple trials that show a full array of statistics for each measurement and returns the worst measurement value

The Keysight Technologies, Inc. SD UHS-I card compliance test application provides a fast and easy way to test, debug and characterize your SD UHS-I card designs. The tests performed by the SD UHS-I compliance test software are based on the SD<sup>1</sup> version 3.0 specifications and Test Spec for Card Ver3.00. The test application offers a user-friendly setup wizard and a comprehensive report that includes margin analysis.

The next-generation SDXC memory card specification with increased bus interface of UHS-I speeds up to 104 MB per second or higher, dramatically improves consumers' digital lifestyles by increasing storage capacity to 2 TB. The compliance test offers bus timing analysis on the command and data lines with eye diagram measurements for all UHS-I speed modes including Default and High speed mode. The compliance test also covers current consumption tests for all UHS-I speed modes including Default and High speed mode. The SD UHS-I card compliance test application is compatible with Keysight Infiniium 9000 and 90000 Series oscilloscopes.

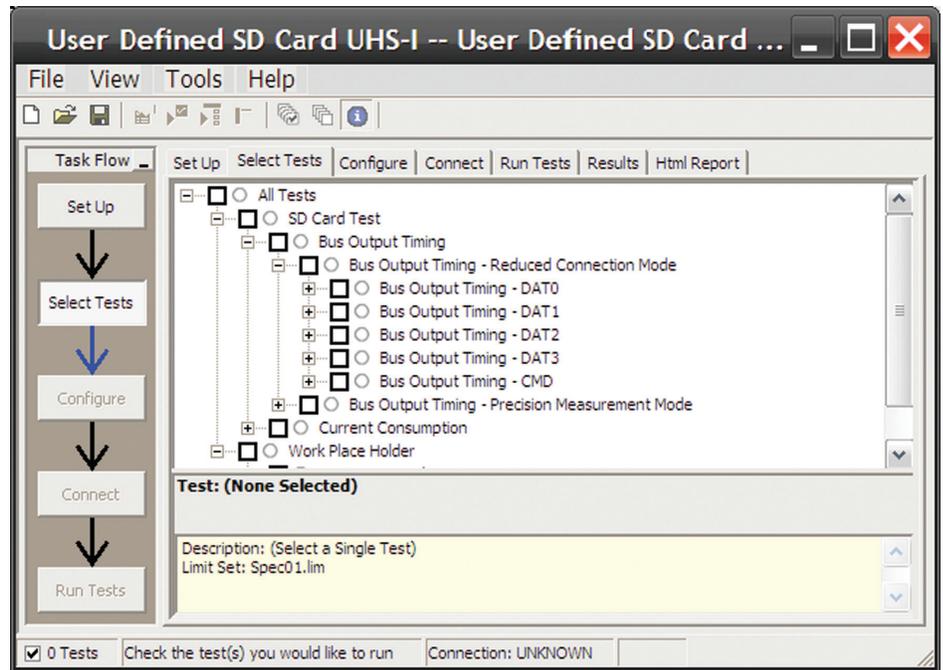


Figure 1. The Keysight automated test engine filters the test selection based on your test setup. You can easily select individual tests or groups of tests with a mouse-click.

## Comprehensive Test Coverage

With the SD UHS-I card compliance test application, you can use the same oscilloscope you use for everyday debugging to perform automated testing and margin analysis based on the SD timing and current consumption specifications. The application automatically configures the oscilloscope for each test and provides informative results. It includes margin analysis indicating how close your device comes to passing or failing the test for each specification. Some of the difficulties in performing the compliance tests are connecting to the target device, configuring the oscilloscope, performing the tests and analyzing the measured results. The SD UHS-I card compliance test application does most of this work for you by using the automated test engine platform with the integrated DUT control capability<sup>2</sup>.

## Easy Test Definition

The test application enhances the usability of Keysight Infiniium oscilloscopes for testing SD UHS-I card devices. The Keysight automated test framework guides you quickly through the steps required to define the setup, perform the tests and view the test results. You can select a category of tests or specify individual tests. The user interface is designed to minimize unnecessary reconnections, which saves time and minimizes potential operator error. You can save the tests and configurations as project files and recall them later for quick testing and review of previous results. Clear menus let you perform tests with minimum mouse clicks.

1. The SD (Secure Digital) is a set of industry standards and promotes Secure Digital (SD) product acceptance in a variety of applications.  
2. Integrated DUT Control capability is provided by Tokyo Electron Devices's SD Host Emulator board.

## Configurability and Guided Connection

The SD UHS-I card compliance test application provides flexibility in your test setup. The SD UHS-I card compliance test application provides you with user-defined controls for critical test parameters such as sampling rate, number of acquisition points used for analysis and customizable violation settings. Once you have configured the tests, the connection page will display the connection diagram for the test you have selected. With the multiple test trial capability, you can extensively characterize the performance of your SD UHS-I card devices. You can run the selected tests until the stop condition is met. The application will then save the worst-case conditions and help you track down the anomalies in your signals.

In addition to providing you with measurement results, the SD UHS-I card compliance test application reports how close you are to the specified limit. You can specify the level at which warnings are to be issued. You are provided with a full array of statistics for each measurement, and you can save worst-case conditions to extensively test the performance of your device.

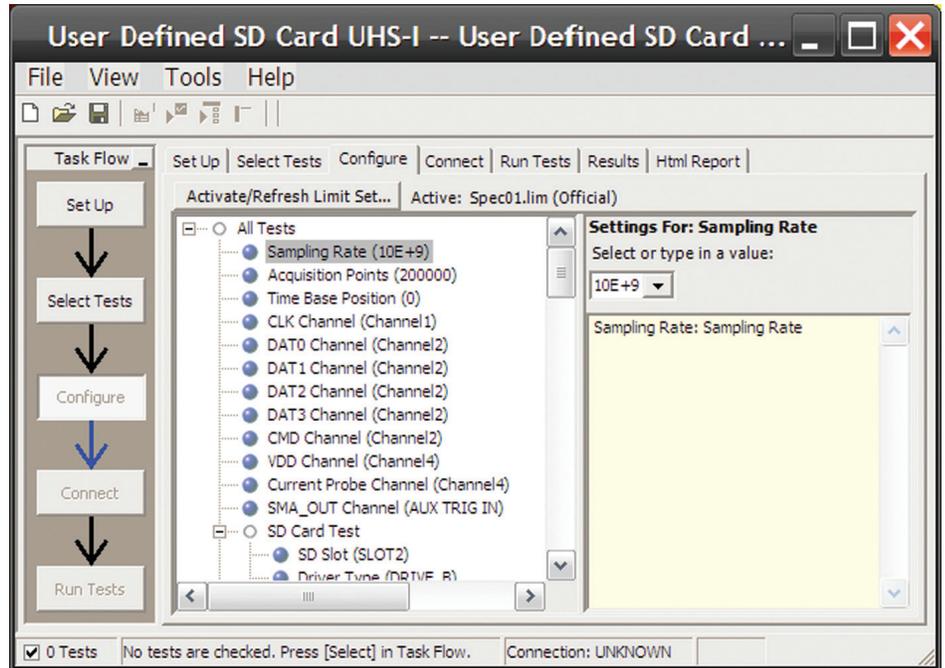


Figure 2. The software provides user-defined controls for test parameters such as sampling rate.

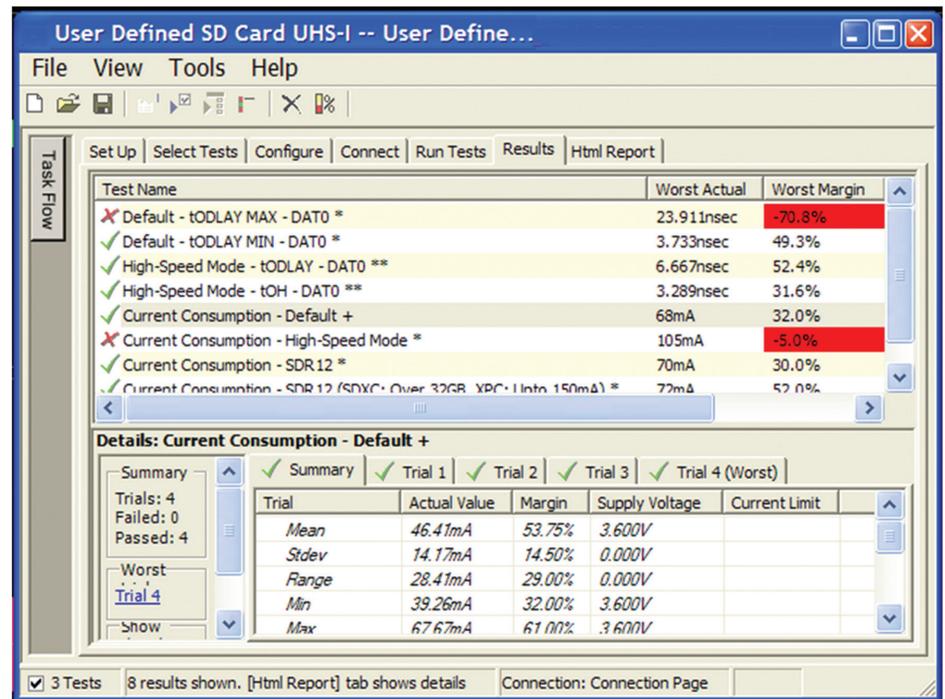


Figure 3. The SD UHS-I test application documents your test parameters, pass or fail status, test specification range, measured values and pass/fail margin.

## Thorough Performance Reporting

The SD UHS-I card compliance test application generates thorough HTML reports that capture the performance, status and margins of your device. It also captures screen shots of critical measurements for your reference and documentation. This report is suitable for printing and sharing with your vendors, customers or colleagues.



### Application Test Report

Overall Results: 0 of 20 Tests Failed

Test Configuration Details	
Device Description	
User Comments:	
Test Session Details	
Infiniium SW Version	02.10.0008
Infiniium Model Number	MSO9254A
Infiniium Serial Number	MY49250145
Application SW Name	User Defined SD Card UHS-I
Application SW Version	0.02.0670
Pass Limits (official)	Spec01.lim
Last Test Date	6/8/2010 4:57:47 PM

### Summary of Results

Margin Thresholds	
Warning	< 2 %
Critical	< 0 %

Pass	# Failed	# Trials	Test Name	Actual Value	Margin	Spec Range
✓	0	1	Default - tODLAY MAX - DAT0	8.267nsec	41.0 %	VALUE <= 14.000nsec
✓	0	1	Default - tODLAY MIN - DAT0	4.267nsec	70.7 %	VALUE >= 2.500nsec

Figure 4. The test application generates a summary report where you can see your device's test results quickly and clearly. Details are available for each test including the test limits, test description and test results, including saved waveforms. In addition, the pass/fail margin is indicated to give you further insight.

## Extensibility

You may add additional custom tests or steps to your application using the User Defined Application (UDA) development tool ([www.keysight.com/find/uda](http://www.keysight.com/find/uda)). Use UDA to develop functional “Add-Ins” that you can plug into your application.

Add-ins may be designed as:

- Complete custom tests (with configuration variables and connection prompts)
- Any custom steps such as pre or post processing scripts, external instrument control and your own device control

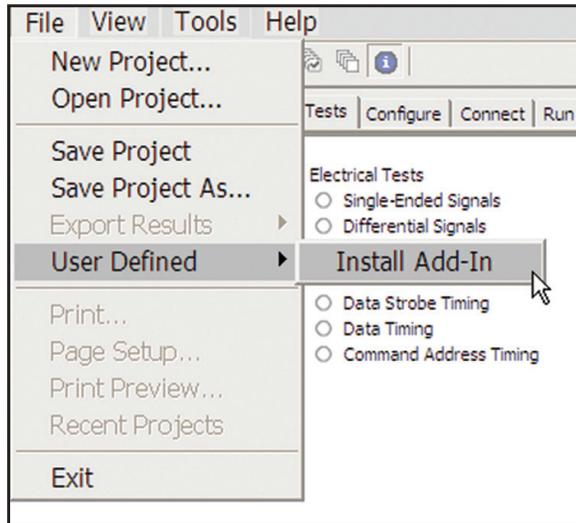


Figure 5. Importing a UDA Add-In into your test application.

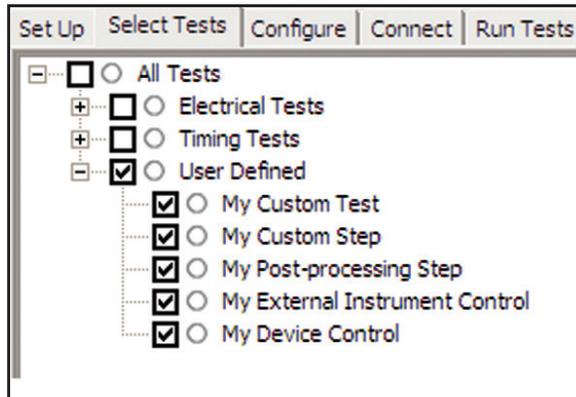


Figure 6. UDA Add-In tests and utilities in your test application.

## Automation

You can completely automate execution of your application's tests and Add-Ins from a separate PC using the included N5452A Remote Interface feature (download free toolkit from [www.keysight.com/find/scope-apps-sw](http://www.keysight.com/find/scope-apps-sw)). You can even create and execute automation scripts right inside the application using a convenient built-in client.

The commands required for each task may be created using a command wizard or from "remote hints" accessible throughout the user interface.

Using automation, you can accelerate complex testing scenarios and even automate manual tasks such as:

- Opening projects, executing tests and saving results
- Executing tests repeatedly while changing configurations
- Sending commands to external instruments
- Executing tests out of order

Combine the power of built-in automation and extensibility to transform your application into a complete test suite executive:

- Interact with your device controller to place it into desired states or test modes before test execution
- Configure additional instruments used in your test suite such as a pattern generator and probe switch matrix
- Export data generated by your tests and post-process it using your favorite environment, such as MATLAB, Python, LabVIEW, C, C++, Visual Basic etc.
- Sequence or repeat the tests and "Add-In" custom steps execution in any order for complete test coverage of the test plan

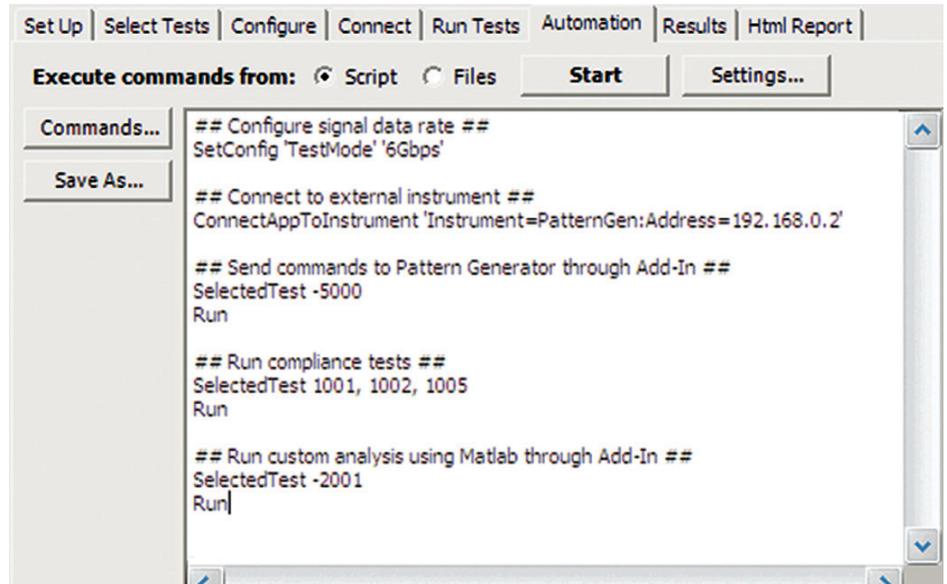


Figure 7. Remote Programming script in the Automation tab.

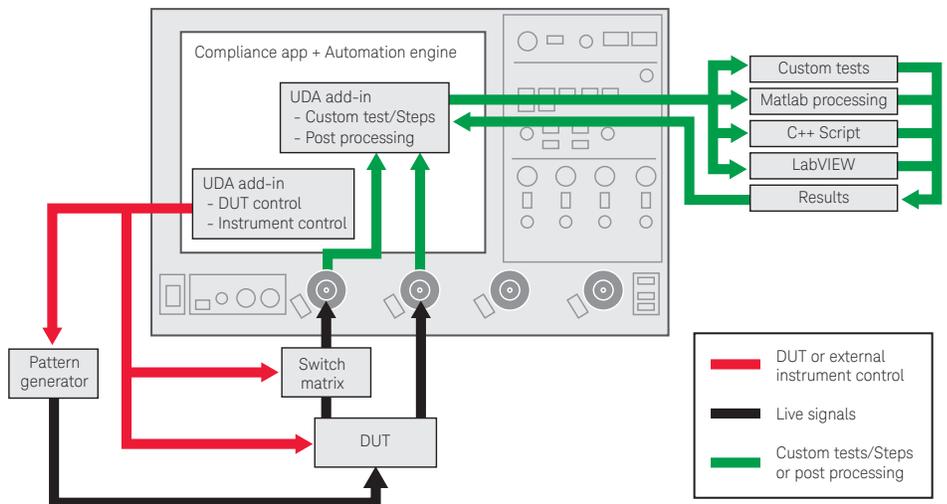


Figure 8. Combine the power of built-in automation and extensibility to transform your application into a complete test suite executive.

## Recommended Oscilloscopes

The SD UHS-I card compliance software is compatible with Keysight Infiniium Series oscilloscopes with operating software revision 4.20 or higher. For oscilloscopes with earlier revisions, free upgrade software is available here:

[www.keysight.com/find/scope-apps-sw](http://www.keysight.com/find/scope-apps-sw)

Data rate	Minimum bandwidth	Minimum channels	Compatible oscilloscopes
Up to 208 MHz	2.5 GHz	2	Infiniium 9000, 90000, S-Series and Z-Series

## Ordering Information

### Software options

Application	License type		Infiniium Z-Series	Infiniium S-Series	Infiniium 90000 Series	Infiniium 9000 Series
SD UHS-I card compliance	Fixed	Factory-installed	U7246A-1FP	U7246B-1FP	–	–
		User-installed	U7246A-1FP	U7246B-1FP	U7246A-1NL	U7246B-1NL
	Floating	Transportable	U7246A-1TP	U7246B-1TP	U7246A-1TP <sup>1,2</sup>	U7246B-1TP <sup>1,2</sup>
		Server-based			–	
Serial data analysis software (included in DSA model)	Fixed	Factory-installed	E2688A-1FP	N5384A-1FP	Option 003	Option 003
		User-installed	E2688A-1FP	N5384A-1FP	E2688A-1NL	N5384A-1NL
	Floating	Transportable	E2688A-1TP	N5384A-1TP	E2688A-1TP <sup>1,2</sup>	N5384A-1TP <sup>1,2</sup>
		Server-based			N5435A-003	

1. Requires software 5.00 and above.

2. Software 4.30 or above requires Windows 7. N2753A Infiniium Windows XP to 7 OS upgrade kit (oscilloscope already has M890 motherboard). N2754A Infiniium Windows XP to 7 OS and M890 motherboard upgrade kit (oscilloscope without M890 motherboard). Verify the M890 motherboard using the procedure found in the Windows 7 upgrade kit data sheet, publication number 5990-8569EN.

## Other Hardware, Probes and Accessories

Model number	Description	Quantity
N2796A/95A	N2796A/95A active probe	2
N278xA	N278xA current probe with N2779A power supply and E2697A high impedance adapter	1
BIT-1080-0000-0	SD UHS-I test fixture kit. See ordering information here: <a href="http://www.bitifeye.com/cms/front_content.php?idart=205">http://www.bitifeye.com/cms/front_content.php?idart=205</a>	1

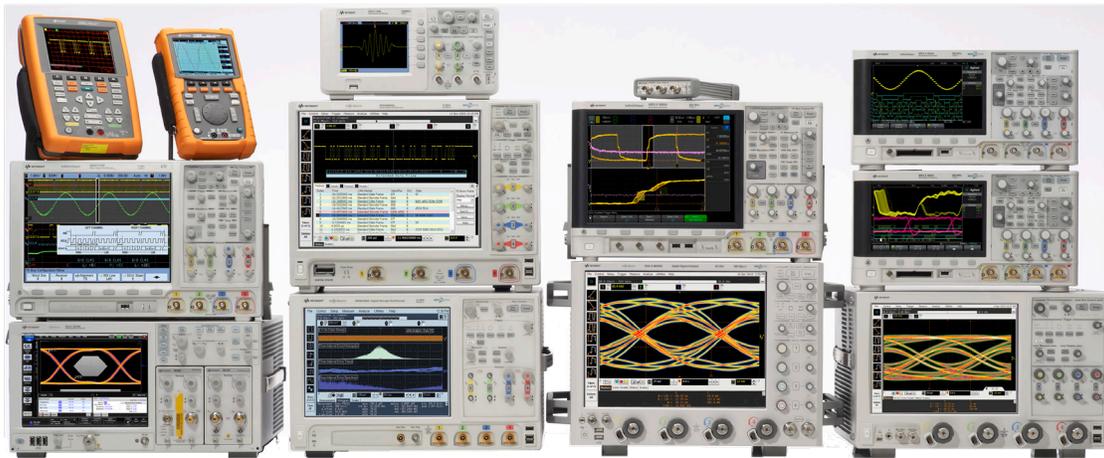
The SD UHS-I Card Compliance Test Application performs the following tests regarding Transmitter of SD Card as per SD Card Compliance Test Specification 3.0.

Test category	Speed mode
Bus output timing	Default, High speed, SDR12, SDR25, SDR50, SDR104 and DDR50
Current consumption	Default, High speed, SDR12, SDR25, SDR50, SDR104 and DDR50

Note: For Card Receiver Test, Tokyo Electron Devices provides software which is included in their SD Host Emulation board. Information about the emulation board is available at [www.bitfeye.com/cms/front\\_content.php?idcat=125](http://www.bitfeye.com/cms/front_content.php?idcat=125)

## Related Literature

Related literature	Publication number
<i>E2688A, N5384A High-Speed Serial Data Analysis and Clock Recovery Software</i> - Data Sheet	5989-0108EN
<i>Oscilloscope Probes and Accessories</i> - Selection Guide	5989-6162EN
<i>Infiniium 90000 Series Oscilloscopes</i> - Data Sheet	5989-7819EN



## Keysight Oscilloscopes

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[www.axiestandard.org](http://www.axiestandard.org)

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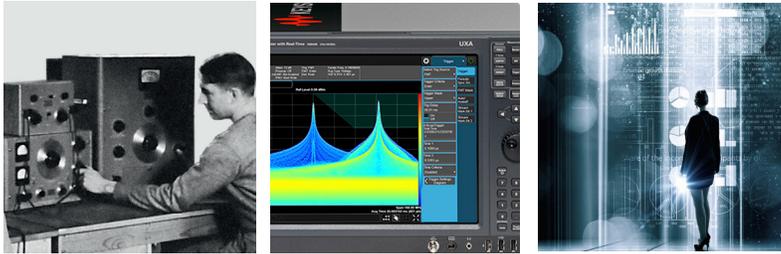
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